PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Keisuke KII, et al.

Docket No: Q78133

Appln. No.: 10/698,438

Group Art Unit: 1794

Confirmation No.: 2685

Examiner: Victor S. CHANG

Filed: November 3, 2003

For: PARTIALLY CROSSLINKED ADHESIVE-SUPPORTED POROUS FILM FOR BATTERY SEPARATOR AND ITS USE

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Shunsuke NOUMI, hereby declare and state:

THAT I am a citizen of Japan;

THAT I have received the degree of Master from Kyoto University Faculty of Engineering, Department of Energy of Hydrocarbon chemistry in March 1997;

THAT I have been employed by NITTO DENKO CORPORATION since April 1997, where I engaged in the development of separators in Lithium ion battery; and

THAT since June 2004, I hold a position as Chief Researcher of Core technology Center;

THAT I personally conducted or supervised the conduct of the following experimentation to show the negative effect caused by the presence of tackifier in the battery.

Experimental Method:

Samples of the battery were prepared as follows.

1. In an argon-displaced glove box, an electrolyte salt lithium hexafluorophosphate ($LiPF_6$) was dissolved in a mixed solvent of ethylene carbonate and diethyl carbonate (volume ratio: 1/2) to prepare an electrolyte liquid.

2. 0.3 % by weight of a tackifier was dissolved in the electrolyte liquid. The tackifiers which were used in this experiment are the following two products and were dissolved in the electrolyte, respectively.

   a. SUPERESTER A125 manufactured by Arakawa Chemical Industries, LTD. (softening point: 125°C)
   b. PENSEL D125 manufactured by Arakawa Chemical Industries, LTD. (softening point: 125°C)

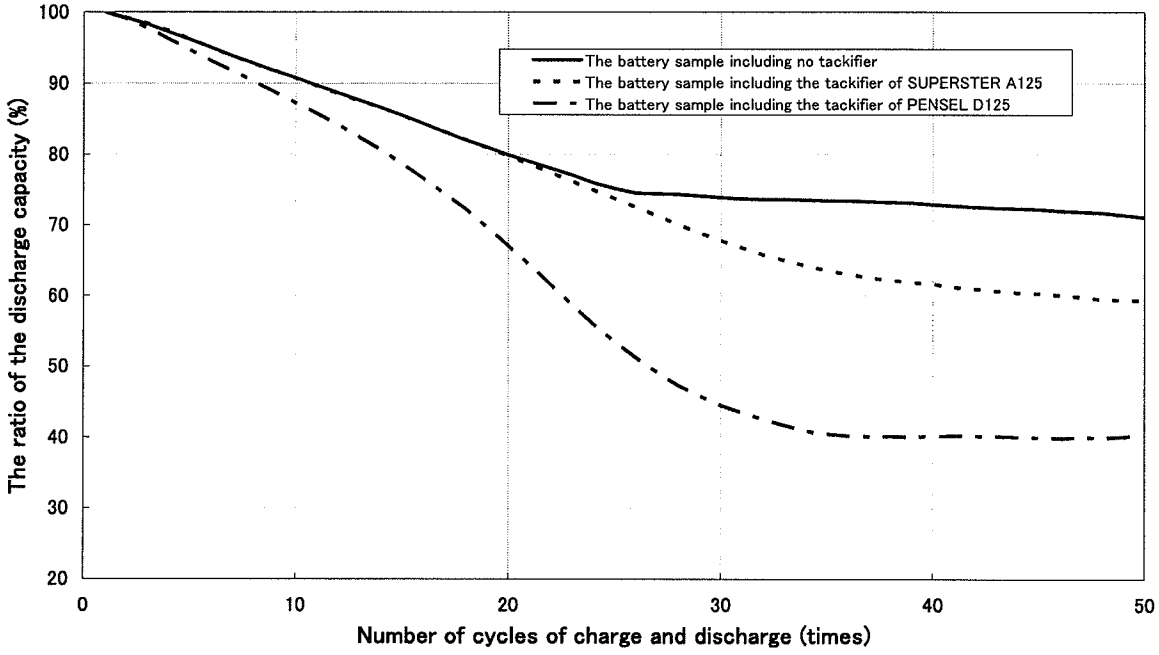
3. A laminate–type single-layer lithium battery having a discharge capacity of 20 mAh was prepared by using the above-mentioned electrolyte liquid including the tackifier or the electrolyte liquid including no tackifier, respectively. The positive electrode of the battery is $LiCoO_2$ and the negative electrode of the battery is carbon.

4. Each of the 3 sample batteries was subjected to measurements for the degradation of the discharge capacity at 60° C. Specifically, the battery was subjected to charge and discharge 0 to 50 times (cycles) at a rate of 1.0 CA. In this regard, an upper limit of the voltage in case of charge was set at 4.2 V, and a lower limit of the voltage in case of discharge was set at 2.75 V.

Results: Fig. 1 shows the relationship of the ratio of discharge capacity and the number of cycles of charge and discharge. As can be seen from Fig. 1, the ratios of discharge capacity of the batteries are lowered with increasing the number of cycles of charge and discharge (namely, the battery deteriorates by repeating charge and discharge thereof). The degradation of the

battery having the electrolyte containing the tackifier is earlier than that of the battery that does not include a tackifier. Accordingly, the tackifier had a negative effect on the performance of the battery.

Fig. 1



I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: _____

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Shunsuke NOUMI